



MODEL:
PUZZLE-M901

**Desktop Network Appliance with Marvell CN9130 Processor,
Six 2.5GbE, On-board 4GB eMMC,
One M.2 slot and RoHS Compliant**

User Manual

Revision

Date	Version	Changes
August 25, 2021	1.00	Initial release

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Manual Conventions



WARNING

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously.



CAUTION

Cautionary messages should be heeded to help reduce the chance of losing data or damaging the product.



NOTE

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help avoid making mistakes.

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Chapter

1

Introduction

1.1 Overview



Figure 1-1: PUZZLE-M901 Series

The PUZZLE-M901 is a high-speed software defined router powered by OpenWrt. The integrated 2.5GbE ports are ideally suited for a wide range of applications, such as SOHO and SMB networking infrastructure.

The PUZZLE-M901 supports six 2.5GbE ports for high-speed network applications. The network interfaces can be defined with various combinations to adopt the SMB network environment. Additionally, its function can also be expanded by open source applications supported in the OpenWrt community.

1.2 Features

The PUZZLE-M901 features are listed below:

- Powered by Marvell® CN9130 quad-core Armv8 Cortex-A72 processor
- Onboard 4GB DDR4 memory
- Six 2.5GbE RJ-45 ports (three via Marvell CN9130; three via Marvell 88F8215)
- 4 GB eMMC
- One console port (pin-header)
- LED indicators: status/power & WAN/LAN interface indicator
- Pre-installed OpenWrt
- RoHS compliant

PUZZLE-M901

1.3 Front Panel

The overview of the front panel is shown in **Figure 1-2**.



Figure 1-2: Front Panel

The default states of the LED indicators located on the front panel are listed below.

 Power	Off	Power off
	Yellow-green	Power on
 Device Status	Off	Device is turned off
	Blinking amber	Device is booting
	Amber	Device is booted up successfully
 WAN Status	Off	WAN port link down
	Blue-green	WAN port link up
 VPN Status	Off	OpenVPN server is disabled
	White	OpenVPN server is enabled

The user can use command line in OpenWrt terminal console to configure these four LED indicators. Refer to **Section 0** for how to configure the LED indicators.

1.4 Rear Panel

An overview of the PUZZLE-M901 rear panel is shown in **Figure 1-3** below.

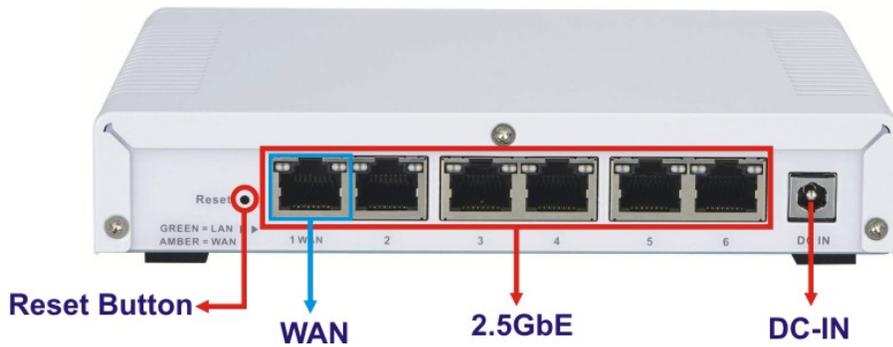
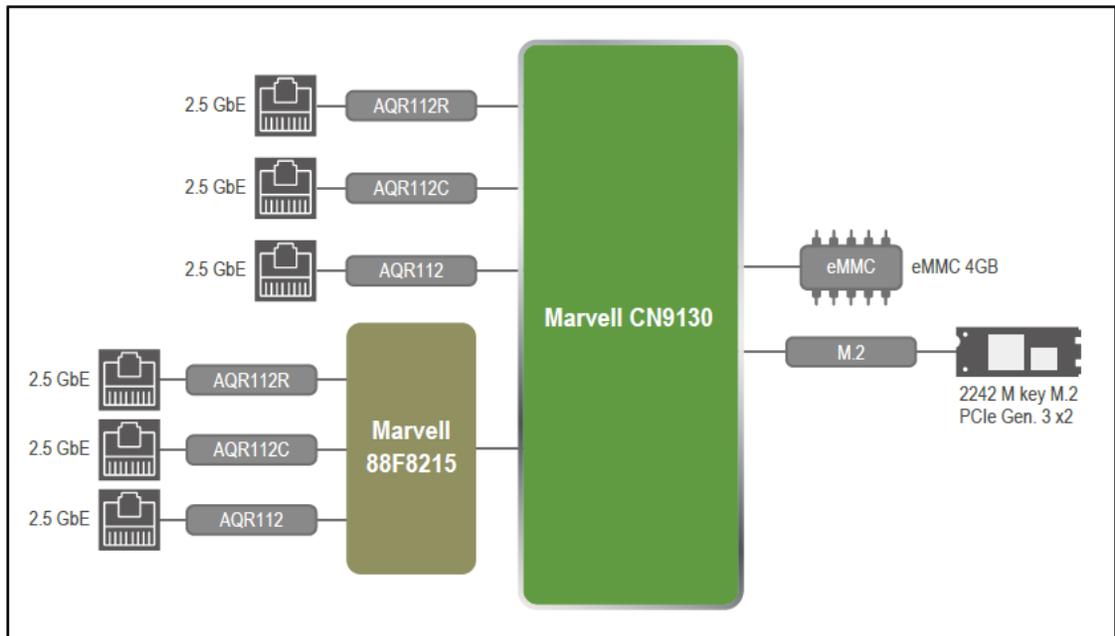


Figure 1-3: Rear Panel

1.5 Block Diagram

The following diagram shows the data flow between the system chipset, the CPU and other components installed on the motherboard.



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1.6 Technical Specifications

The PUZZLE-M901 technical specifications are listed in **Table 1-1**.

System	
CPU (SoC)	Marvell® CN9130 quad-core Armv8 Cortex®-72 processor @ up to 2200 MHz
Memory	On-board 4GB DDR4
eMMC	4 GB eMMC
M.2 SSD	1 x M.2 2242 M-key slot (PCIe 3.0 x2)
Ethernet IC	Aquantia AQR112R Aquantia AQR112C Aquantia AQR112
Ethernet Port	1 x 2.5GbE LAN integrated in CPU via PHY Aquantia AQR112R 1 x 2.5GbE LAN integrated in CPU via PHY Aquantia AQR112C 1 x 2.5GbE LAN integrated in CPU via PHY Aquantia AQR112 1 x 2.5GbE LAN via Marvell 88F8215 (PHY: Aquantia AQR112R) 1 x 2.5GbE LAN via Marvell 88F8215 (PHY: Aquantia AQR112C) 1 x 2.5GbE LAN via Marvell 88F8215 (PHY: Aquantia AQR112)
I/O and Indicators	
USB	1 x USB 3.2 Gen 1 (5 Gb/s) port (internal)
Indicators	1 x Power (yellow-green) 1 x Device status (amber) 2 x Device connection status (blue-green & white)
Button	Factory reset button
System Warning	Beep
Power	
Power Input	1 x DC-in jack
Thermal Solution	Active fan
Environmental and Mechanical	
Mounting	Desktop

Chapter

2

Unpacking

2.1 Anti-static Precautions



WARNING:

Failure to take ESD precautions during installation may result in permanent damage to the PUZZLE-M901 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the PUZZLE-M901. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the PUZZLE-M901 or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- **Wear an anti-static wristband:** Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- **Self-grounding:** Before handling the board, touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- **Use an anti-static pad:** When configuring the PUZZLE-M901, place it on an anti-static pad. This reduces the possibility of ESD damaging the PUZZLE-M901.

2.2 Unpacking Precautions

When the PUZZLE-M901 is unpacked, please do the following:

- Follow the anti-static precautions outlined in **Section 2.1**.
- Make sure the packing box is facing upwards so the PUZZLE-M901 does not fall out of the box.
- Make sure all the components shown in **Section 2.3** are present.

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2.3 Packing List



NOTE:

If some of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the PUZZLE-M901 from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@ieiworld.com.

The PUZZLE-M901 is shipped with the following components:

Quantity	Item	Image
1	PUZZLE-M901	
1	Power cord	
1	Power adapter	

Chapter

3

Installation

PUZZLE-M901

3.1 Installation Precautions

During installation, be aware of the precautions below:

- **Read the user manual:** The user manual provides a complete description of the PUZZLE-M901, installation instructions and configuration options.
- **DANGER! Disconnect Power:** Power to the PUZZLE-M901 must be disconnected during the installation process. Failing to disconnect the power may cause severe injury to the body and/or damage to the system.
- **Qualified Personnel:** The PUZZLE-M901 must be installed and operated only by trained and qualified personnel. Maintenance, upgrades, or repairs may only be carried out by qualified personnel who are familiar with the associated dangers.
- **Air Circulation:** Make sure there is sufficient air circulation when installing the PUZZLE-M901. The PUZZLE-M901's cooling vents must not be obstructed by any objects. Blocking the vents can cause overheating of the PUZZLE-M901. Leave at least 5 cm of clearance around the PUZZLE-M901 to prevent overheating.
- **Grounding:** The PUZZLE-M901 should be properly grounded. The voltage feeds must not be overloaded. Adjust the cabling and provide external overcharge protection per the electrical values indicated on the label attached to the back of the PUZZLE-M901.

3.2 Power-On and Setup Procedure



WARNING:

Make sure a power supply with the correct input voltage is being fed into the system. Incorrect voltages applied to the system may cause damage to the internal electronic components and may also cause injury to the user.

To power-on and set up the PUZZLE-M901 please follow the steps below:

- Step 1:** Connect the power adapter shipped with the PUZZLE-M901 to the power jack on the rear panel.
- Step 2:** Use a power cord to connect the power adapter and the power source. **Ensure to connect the power cord to a socket-outlet with earthing connection.**
- Step 3:** The power LED indicator on the front panel turns to green.
- Step 4:** Connect the PUZZLE-M901 to the network via the WAN port on the rear panel.
- Step 5:** Connect the PUZZLE-M901 to a computer or other network devices.
- Step 6:** Check if the WAN interface LED is amber and LAN interface LED is green.
- Step 7:** Use the following information when prompted for the username and password for login to the system.

Username: root

Password: PUZZLE + the last 6 digits of the MAC address (uppercase letters, no spaces, for example: PUZZLE001B22)

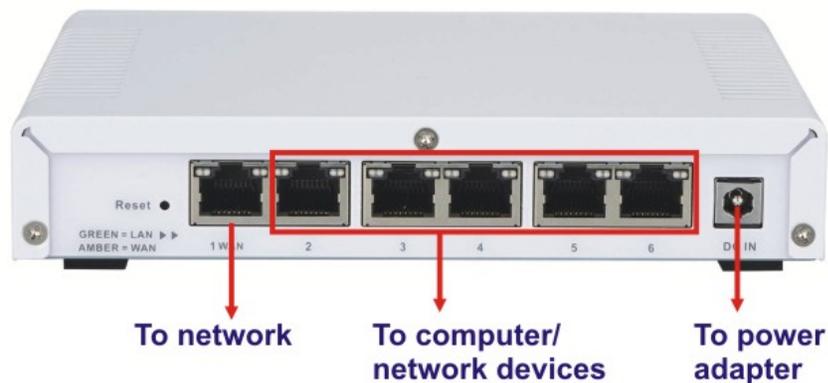


Figure 3-1: System Connection

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3.3 Configure LED Indicators

The user can use command line in OpenWrt terminal console to configure the four LED indicators on the system front panel.

3.3.1 Initial Baud Rate

Set baud rate to 115200

```
# stty -F /dev/ttyS1 115200
```

3.3.2 Change LEDs

The user can use the following command lines to configure on/off/blink status of the LEDs.



3.3.2.1 LED1

LED1 ON

```
# echo -n -e "\x40\x52\x30\x30\x12" > /dev/ttyS1
```

LED1 OFF

```
# echo -n -e "\x40\x52\x30\x31\x13" > /dev/ttyS1
```

LED1 Blink 1HZ

```
# echo -n -e "\x40\x52\x30\x32\x10" > /dev/ttyS1
```

LED1 Blink 5HZ

```
# echo -n -e "\x40\x52\x30\x33\x11" > /dev/ttyS1
```

3.3.2.2 LED2

LED2 ON

```
# echo -n -e "\x40\x52\x31\x30\x13" > /dev/ttyS1
```

LED2 OFF

```
# echo -n -e "\x40\x52\x31\x31\x12" > /dev/ttyS1
```

LED2 Blink 1HZ

```
# echo -n -e "\x40\x52\x31\x32\x11" > /dev/ttyS1
```

LED2 Blink 5HZ

```
# echo -n -e "\x40\x52\x31\x33\x10" > /dev/ttyS1
```

3.3.2.3 LED3

LED3 ON

```
# echo -n -e "\x40\x52\x32\x30\x10" > /dev/ttyS1
```

LED3 OFF

```
# echo -n -e "\x40\x52\x32\x31\x11" > /dev/ttyS1
```

LED3 Blink 1HZ

```
# echo -n -e "\x40\x52\x32\x32\x12" > /dev/ttyS1
```

LED3 Blink 5HZ

```
# echo -n -e "\x40\x52\x32\x33\x13" > /dev/ttyS1
```

3.3.2.4 LED4

LED4 ON

```
# echo -n -e "\x40\x52\x33\x30\x11" > /dev/ttyS1
```

LED4 OFF

```
# echo -n -e "\x40\x52\x33\x31\x10" > /dev/ttyS1
```

LED4 Blink 1HZ

```
# echo -n -e "\x40\x52\x33\x32\x13" > /dev/ttyS1
```

LED4 Blink 5HZ

```
# echo -n -e "\x40\x52\x33\x33\x12" > /dev/ttyS1
```

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3.4 Resource Download

All the resources for the PUZZLE-M901 are available on IEI Resource Download Center (<https://download.ieiworld.com>). Type PUZZLE-M901 and press Enter to find all the relevant software, utilities, and documentation.

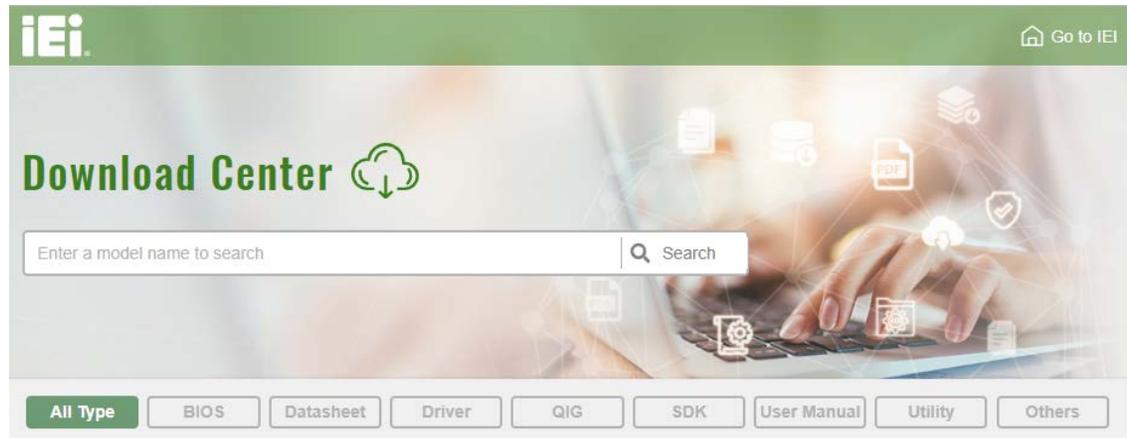


Figure 3-2: IEI Resource Download Center

Appendix

A

Regulatory Compliance

DECLARATION OF CONFORMITY

This equipment is in conformity with the following EU directives:

- EMC Directive 2014/30/EU
- Low-Voltage Directive 2014/35/EU
- RoHS II Directive 2015/863/EU

If the user modifies and/or install other devices in the equipment, the CE conformity declaration may no longer apply.

If this equipment has telecommunications functionality, it also complies with the requirements of the R&TTE Directive 1999/5/EC.

English

IEI Integration Corp declares that this equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Български [Bulgarian]

IEI Integration Corp. декларира че този оборудване е в съответствие със съществените изисквания и другите приложими правила на Директива 1999/5/EC.

Česky [Czech]

IEI Integration Corp tímto prohlašuje, že tento zařizení je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.

Dansk [Danish]

IEI Integration Corp erklærer herved, at følgende udstyr overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.

Deutsch [German]

IEI Integration Corp, erklärt dieses Gerät entspricht den grundlegenden Anforderungen und den weiteren entsprechenden Vorgaben der Richtlinie 1999/5/EU.

Eesti [Estonian]

IEI Integration Corp deklareerib seadme seadme vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.

Español [Spanish]

IEI Integration Corp declara que el equipo cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.

Ελληνική [Greek]

IEI Integration Corp ΔΗΛΩΝΕΙ ΟΤΙ ΕΞΟΠΛΙΣΜΟΣ ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/EK.

Français [French]

IEI Integration Corp déclare que l'appareil est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.

Italiano [Italian]

IEI Integration Corp dichiara che questo apparecchio è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.

Latviski [Latvian]

IEI Integration Corp deklarē, ka iekārta atbilst būtiskajām prasībām un citiem ar to saistītajiem noteikumiem Direktīvas 1999/5/EK.

Lietuvių [Lithuanian]

IEI Integration Corp deklaruoja, kad šis įranga atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.

Nederlands [Dutch]

IEI Integration Corp dat het toestel toestel in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.

Malti [Maltese]

IEI Integration Corp jiddikjara li dan prodott jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 1999/5/EC.

Magyar [Hungarian]

IEI Integration Corp nyilatkozom, hogy a berendezés megfelel a vonatkozó alapvető követelményeknek és az 1999/5/EC irányelv egyéb előírásainak.

Polski [Polish]

IEI Integration Corp oświadcza, że wyrobu jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.

Português [Portuguese]

IEI Integration Corp declara que este equipamento está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.

PUZZLE-M901

Româna [Romanian]

IEI Integration Corp declară că acest echipament este în conformitate cu cerințele esențiale și cu celelalte prevederi relevante ale Directivei 1999/5/CE.

Slovensko [Slovenian]

IEI Integration Corp izjavlja, da je ta opreme v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.

Slovensky [Slovak]

IEI Integration Corp týmto vyhlasuje, že zariadenia spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.

Suomi [Finnish]

IEI Integration Corp vakuuttaa täten että laitteet on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.

Svenska [Swedish]

IEI Integration Corp förklarar att denna utrustningstyp står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

FCC WARNING

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

ROHS STATEMENT

The label on the product indicates this product conforms to European (EU) Restriction of Hazardous Substances (RoHS) that set maximum concentration limits on hazardous materials used in electrical and electronic equipment.

CHINA ROHS

The label on the product indicates the estimated “Environmentally Friendly Use Period” (EFUP). This is an estimate of the number of years that these substances would “not leak out or undergo abrupt change.” This product may contain replaceable sub-assemblies/components which have a shorter EFUP such as batteries and lamps. These components will be separately marked.

Appendix

B

Safety Precautions

B.1 Safety Precautions



WARNING:

The precautions outlined in this appendix should be strictly followed. Failure to follow these precautions may result in permanent damage to the PUZZLE-M901.

Please follow the safety precautions outlined in the sections that follow:

B.1.1 General Safety Precautions

Please ensure the following safety precautions are adhered to at all times.

- ***Make sure the power is turned off and the power cord is disconnected*** when moving, installing or modifying the system.
- ***Do not apply voltage levels that exceed the specified voltage range.*** Doing so may cause fire and/or an electrical shock.
- ***Electric shocks can occur*** if opened while still powered on.
- ***Do not drop or insert any objects*** into the ventilation openings.
- ***If considerable amounts of dust, water, or fluids enter the system***, turn off the power supply immediately, unplug the power cord, and contact the system vendor.
- ***This equipment is not suitable for use in locations where children are likely to be present.***
- **DO NOT:**
 - Drop the system against a hard surface.
 - In a site where the ambient temperature exceeds the rated temperature

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B.1.2 Anti-static Precautions



WARNING:

Failure to take ESD precautions during the installation of the PUZZLE-M901 may result in permanent damage to the PUZZLE-M901 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the PUZZLE-M901. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the PUZZLE-M901 is opened and any of the electrical components are handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband:*** Wearing a simple anti-static wristband can help to prevent ESD from damaging any electrical component.
- ***Self-grounding:*** Before handling any electrical component, touch any grounded conducting material. During the time the electrical component is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad:*** When configuring or working with an electrical component, place it on an anti-static pad. This reduces the possibility of ESD damage.
- ***Only handle the edges of the electrical component:*** When handling the electrical component, hold the electrical component by its edges.

B.1.3 Product Disposal

**CAUTION:**

Risk of explosion if the battery is replaced by an incorrect type;

Replacement of a battery with an incorrect type that can defeat a safeguard (for example, in the case of some lithium battery types);

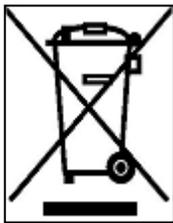
Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery, that can result in an explosion;

Leaving a battery in an extremely high temperature surrounding environment that can result in an explosion or the leakage of flammable liquid or gas;

A battery subjected to extremely low air pressure that may result in an explosion or the leakage of flammable liquid or gas;

Dispose of used batteries according to instructions and local regulations.

- Outside the European Union - If you wish to dispose of used electrical and electronic products outside the European Union, please contact your local authority so as to comply with the correct disposal method.
- Within the European Union:



EU-wide legislation, as implemented in each Member State, requires that waste electrical and electronic products carrying the mark (left) must be disposed of separately from normal household waste. This includes monitors and electrical accessories, such as signal cables or power cords. When you need to dispose of your display products, please follow the guidance of your local authority, or ask the shop where you purchased the product. The mark on electrical and electronic products only applies to the current European Union Member States.

Please follow the national guidelines for electrical and electronic product disposal.

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B.2 Maintenance and Cleaning Precautions

When maintaining or cleaning the PUZZLE-M901, please follow the guidelines below.

B.2.1 Maintenance and Cleaning

Prior to cleaning any part or component of the PUZZLE-M901, please read the details below.

- The interior of the device does not require cleaning. Keep fluids away from the device interior.
- Be cautious of all small removable components when vacuuming the device.
- Turn the device off before cleaning the device.
- Never drop any objects or liquids through the openings of the device.
- Be cautious of any possible allergic reactions to solvents or chemicals used when cleaning the device.
- Avoid eating, drinking and smoking within vicinity of the device.

B.2.2 Cleaning Tools

Some components in the PUZZLE-M901 may only be cleaned using a product specifically designed for the purpose. In such case, the product will be explicitly mentioned in the cleaning tips. Below is a list of items to use when cleaning the PUZZLE-M901.

- **Cloth** – Although paper towels or tissues can be used, a soft, clean piece of cloth is recommended when cleaning the PUZZLE-M901.
- **Water or rubbing alcohol** – A cloth moistened with water or rubbing alcohol can be used to clean the PUZZLE-M901.
- **Using solvents** – The use of solvents is not recommended when cleaning the PUZZLE-M901 as they may damage the plastic parts.
- **Vacuum cleaner** – Using a vacuum specifically designed for computers is one of the best methods of cleaning the PUZZLE-M901. Dust and dirt can restrict the airflow in the PUZZLE-M901 and cause its circuitry to corrode.
- **Swabs** - Swabs moistened with rubbing alcohol or water are excellent tools for wiping hard to reach areas. Whenever possible, it is best to use lint free swabs such as foam swabs for cleaning.

Appendix

C

Hazardous Materials Disclosure

PUZZLE-M901

C.1 RoHS II Directive (2015/863/EU)

The details provided in this appendix are to ensure that the product is compliant with the RoHS II Directive (2015/863/EU). The table below acknowledges the presences of small quantities of certain substances in the product, and is applicable to RoHS II Directive (2015/863/EU).

Please refer to the following table.

Part Name	Toxic or Hazardous Substances and Elements									
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)	Bis(2-ethylhexyl) phthalate (DEHP)	Butyl benzyl phthalate (BBP)	Dibutyl phthalate (DBP)	Diisobutyl phthalate (DIBP)
Housing	O	O	O	O	O	O	O	O	O	O
Display	O	O	O	O	O	O	O	O	O	O
Printed Circuit Board	O	O	O	O	O	O	O	O	O	O
Metal Fasteners	O	O	O	O	O	O	O	O	O	O
Cable Assembly	O	O	O	O	O	O	O	O	O	O
Fan Assembly	O	O	O	O	O	O	O	O	O	O
Power Supply Assemblies	O	O	O	O	O	O	O	O	O	O
Battery	O	O	O	O	O	O	O	O	O	O

O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in Directive (EU) 2015/863.

X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in Directive (EU) 2015/863.

C.2 China RoHS

此附件旨在确保本产品符合中国 RoHS 标准。以下表格标示此产品中某有毒物质的含量符合中国 RoHS 标准规定的限量要求。

本产品上会附有“环境友好使用期限”的标签，此期限是估算这些物质“不会有泄漏或突变”的年限。本产品可能包含有较短的环境友好使用期限的可替换元件，像是电池或灯管，这些元件将会单独标示出来。

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
壳体	○	○	○	○	○	○
显示	○	○	○	○	○	○
印刷电路板	○	○	○	○	○	○
金属螺帽	○	○	○	○	○	○
电缆组装	○	○	○	○	○	○
风扇组装	○	○	○	○	○	○
电力供应组装	○	○	○	○	○	○
电池	○	○	○	○	○	○

○: 表示该有毒有害物质在该部件所有物质材料中的含量均在 SJ/T11364-2014 與 GB/T26572-2011 标准规定的限量要求以下。

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11364-2014 與 GB/T26572-2011 标准规定的限量要求。